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A Comparison of National Saving Rates in the UK, US and Italy

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Abstract

We develop the approach of Gokhale et al. (1996), based on the life-cycle model of savings, to decompose the differences in the national saving rates between the UK, US and Italy. Our work suggests that the US saving rate is lower principally because Americans on average retire later. In contrast, the Italian saving rate is higher predominantly because Italians are credit constrained, particularly when young. We also found that demography and the different tax and benefit systems are able to explain little of the cross-sectional differences in saving rates. The study accounts for the possible importance of intergenerational private transfers in determining saving rates.

Key Words: Saving Rates, International Comparisons, Intergenerational Transfers, Borrowing Constraints

JEL Reference Number: D91, E21, D31

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1 Introduction

National saving rates differ substantially across countries, even within the more economically developed. Recent comprehensive surveys by Deaton (1992), Browning and Lusardi (1996) and Attanasio (1999) stress that the only way to understand the differences in the aggregate numbers is by analysing the microeconomic survey data. Only then can it be ascertained whether the differences are caused by differences in institutional structure, differences in economic incentives, or differences in national behaviour. An exhaustive list of the possible factors that might account for differences in aggregate saving rates would include:

1. Demography. The balance of the population between those yet to join the workforce, those of working age and those retired will influence the savings rate. As households tend to save more when working, the savings rate will be higher in countries where the proportion of people of working age is higher, other things being equal.
2. The welfare state. If the retired receive state pensions, health care and other state benefits that are financed predominantly out of taxes levied on people of working age, then saving will be lower relative to a country in which people need to make greater personal provision for their retirement.
3. Retirement behaviour. In a country where people retire later, then all other things being equal, they are likely to save less than those in a country where they tend to retire earlier.
4. Constraints on Borrowing. People may wish to borrow, particularly when young, to finance house purchases or immediate consumption with the intention of repaying the loan later. If access to loans in one country is tighter or more regulated relative to another, then this country is likely to have a higher saving ratio.
5. Income distribution over a lifetime. The way in which income varies with age may differ from country to country, in part because different countries have different systems of tertiary education. This should be expected to have some influence on saving rates.
6. Income uncertainty. If people in one country face more income uncertainty than in another, and especially if they are borrowing constrained, they will save more to insure themselves against adverse income shocks.
7. Capital gains. The national accounts do not include capital gains on assets as part of income. Hence if people in one country hold on average a higher proportion of their assets as corporate equity (whose return can be substantially in the form of capital gains) than in another then their measured saving ratio is likely to be lower everything else being the same.

In this paper we attempt to quantify the importance of these factors in determining the national savings rates by attributing the differences in net national saving rates to differences in household characteristics and resources, using an approach similar to Gokhale et al. (1996). However, whereas Gokhale et al. (1996) studied the evolution of saving behaviour over time in

one country, we study cross-country differences. Such a cross-country comparison is insightful; we shall show that the different aggregate national saving rates in the UK, US and Italy can be traced back to the *very* different household distributions of economic resources and characteristics. Though we recognise that it will always be possible to improve on our analysis, particularly as more data becomes available, we believe that this study does highlight which of the above factors are quantitatively more important than others.

Recently, two large-scale projects investigated the cross-country differences in household saving behaviour resulted in books edited by Poterba (1994) and by Börsch-Supan (2003). These volumes contain detailed studies of individual countries within a common framework, which allows a *description* of differences in household saving behaviour across countries. These studies discuss *potentially* important factors that affect saving behaviour in each country, but here we try to *quantify* their relative importance. To achieve this, it is necessary to make stronger assumptions, and so our analysis should be considered as building on theirs.

These studies analyse micro-level individual and household data, as a means to explain differences in aggregate economic variables. However Gokhale et al. (1996) suggest using the life-cycle model of consumption savings as a way of quantitatively attributing the aggregate differences to differences in the micro data. In its simplest form, the life-cycle model suggests that individuals, faced with a finite life span and a concentrated and uncertain income stream, save so as to smooth their consumption; by borrowing when income is low and saving when it is high. More precisely it states that consumption in any period, is equal to an individual's propensity to consume times the expected present discounted sum of his or her future resources. Given that we can observe average consumption, and estimate the expected present discounted sum of future resources, we can also calculate the individuals' implied propensity to consume. We are thus able to attribute the differences in savings behaviour of a representative individual or equivalently a cohort into differences in the time profile or distribution of incomes across cohorts and differences in the propensity to consume.

For this paper, we have developed a unique data set of the distribution of all incomes and allocation of all expenditures of the household sector by age and sex for the base year of 1997 in the three countries: United Kingdom, United States and Italy.¹ These data are constructed using survey data from many sources; they are then benchmarked to the total amount received or spent on each category in the respective national accounts totals. In this way we are able to derive a consistent breakdown of personal sector savings by age and sex for each country. Our analysis of these data suggest that the differences between these three countries can be predominantly traced down to two factors only. First, people in the US retire far later than their counterparts in the UK and Italy, so they save less. Secondly, we find that young Italians save more than either their US or UK counterparts. We suggest that the lower estimated propensity to consume of young Italians is due to borrowing constraints and in particular the high proportional downpayment for house purchases required in Italy. This has been well-documented by both Jappelli and Pagano (1999) and Jappelli and Pistaferri (2000).

Our analysis, described so far, has highlighted the importance of the inter-generational distribution of resources, including the distribution of wealth, as well as age-specific propensities

¹We would like to thank Jagadeesh Gokhale and Larry Kotlikoff for the data on the US (which we updated) and Roberto Carderelli and Maria Cozzolino for some of Italian profiles, particularly on health expenditures.

to consume in explaining the differences in saving behaviour. However some of these distributions are jointly determined, in particular the age-specific propensities to consume and the distribution of wealth. In order to account for this, we generate age specific wealth holdings for every country, consistent with our estimates of the age-specific propensities to consume. We then recalculate our decomposition, using the generated distributions of wealth. We find that the conclusions from this experiment are in close agreement with those from the first. The very same factors explain the differences in saving behavior in the three countries.

The paper is organised as follows. The next section provides a discussion of related research and discusses differences in savings rates between our three countries. We then describe in detail the method which we use to decompose differences in national savings across countries. Section 3 discusses our data set and related measurement issues (some more details are given in the appendix of the associated working paper, Kirsanova and Sefton (2006)). We also discuss how the constructed profiles reflect the stylised facts for each country. Section 4 discuss our main result: the decomposition of differences in saving rates between countries. In Section 5 we investigate the sensitivity of our results to various assumptions, in particular private inter-generational transfers and the joint determinacy of consumption and wealth profiles. Section 6 concludes.

2 Micro Analysis of Saving Rates

The idea of decomposing aggregate saving rates into several factors, which can be traced down to household behaviour, has a long tradition in macroeconomics. Bosworth et al. (1991), Attanasio (1998) and Gokhale et al. (1996) have used micro survey data on *household* and *individual* saving rates in order to analyse the decline in the US saving rates. Jappelli and Pagano (1999) used a similar approach to examine reasons for the high personal sector saving rates in Italy. Attanasio and Banks (1998) were the first to use micro data to compare saving decisions across two countries, the US and UK, but their work focused on whether tax incentives encouraged saving.

One way to study the saving behaviour is to decompose the personal sector saving rate as

$$SR_t = \frac{Y_t^p - C_t}{Y_t} = \sum_{\text{all } a} \left(\frac{y_{a,t} - c_{a,t}}{y_{a,t}} \right) \left(\frac{y_{a,t}}{Y_t/N_t} \right) \left(\frac{n_{a,t}}{N_t} \right), \quad (1)$$

where

Y_t^p is total income of the personal sector in period t ,

C_t is total consumption of the personal sector in period t ,

N_t is the total population in period t ,

$y_{a,t}$ is the average total per capita income of an individual aged a in period t ,

$c_{a,t}$ is the average per capita consumption of an individual aged a in period t ,

$n_{a,t}$ is the number individuals aged a in period t .

The personal sector saving rate, therefore, can be affected by the distribution of individual age-specific saving rates, by income distribution by age and by the population distribution.

This approach implicitly makes the reasonable assumption that both the age-specific saving rates and the distribution of income by age, at least to a first approximation, are independent

of the demographic composition of the population.² However, it is more problematic to use this method in order to explain changes in saving rates by the changes in the age-specific saving rates, $(y_{a,t} - c_{a,t})/y_{a,t}$ or by the changes in the distribution of income by age, $y_{a,t}/(Y_t/N_t)$. Clearly, the age-specific saving rate is a function of the age-specific income amongst other things, and so can not be treated independently.

This approach is also difficult to apply if we want to assess implications of *individual* behaviour for *national* saving. Gokhale et al. (1996) discuss that personal savings do not determine national savings. Different classifications of social security contributions in different countries leave national savings unchanged, but imply different levels of personal saving. In a cross-country study, as Jappelli (2001) argues in his critique of the previous work in this area, it is essential to adjust for the difference in scale of mandatory and discretionary contributions to pension funds. This is because the national accounts treat mandatory contributions like a tax but discretionary contributions like savings. Hence personal sector saving rates can give a misleading picture of the amount of saving that is undertaken in different countries.

Another area, which is not discussed in such detail in Gokhale et al. (1996) but is particularly important in this study, is any systematic differences in private sector financing. Table 1 is a summary of the sectoral accounts for all three countries in 1997 on a comparable basis. In the UK, private sector savings is roughly three times personal sector savings; in the US the two are roughly equal and in Italy private sector saving is negligible. As an illustration of how such large differences can arise, compare the impact on the respective savings rates of a company that pays out all after tax earnings as dividends and raises all new finance for capital expenditures through new equity issue with a company that retains enough of its earnings to finance its capital expenditures. In the former case the capital expenditures will appear as part of personal sector savings and in the latter they will appear as corporate sector savings. However the distinction is predominantly an accounting one. To see through such possible differences, it is necessary to investigate savings rates at the national level where the distinction washes out.

In this paper we therefore focus *directly* on household *consumption* and on national saving. We define net national saving rate as $(Y - C - G)/Y$ where Y refers to net national income at market prices, C to household³ consumption and G to government purchases (collective consumption). Table 1 reports sector accounts for the three countries on a consistent basis; this allows us to compute comparable national and household saving rates. Our measure of the household saving rate (we follow Gokhale et al. (1996) in this choice), is defined as $(Y - C - G)/(Y - G)$ and is reported in Table 2. This is the share of output after government consumption saved by the private sector. This saving rate is not affected by present value neutral changes in the timing of income flows. Nor is it altered by changes in the classification of government receipts and expenditures, assuming all agents are rational and are not deceived by the government's choice of language, nor by differences in corporate financing.

We study household saving decisions using a simple life-cycle model. This suggests that the appropriate measure of household saving is the propensity to consume out of the present value of

²Bosworth et al. (1991) use this decomposition to demonstrate that changes to the age distribution of the US population, $p_{a,t} = n_{a,t}/N$, could not account for the fall in the US personal sector's saving rate over the 1980s and 1990s.

³In this paper we use the terms personal sector and household sector interchangeably. This is because we allocate all expenditure of Non-Profit Institutions serving Households (NPISH) to households.

their remaining life-cycle resources. This propensity is invariant to present-value neutral changes in timing of after-tax income flows, each of which produces a different value of personal saving.

Using a life-cycle model, we decompose differences in saving rates (which can be small) into the sum of several effects (each of which can be large). In brief, the algorithm is as follows. In the standard life-cycle model each cohort's consumption is proportional to the present value of its remaining life-time resources, that is

$$c_{a,t} = \alpha_a (h_{a,t} + w_{a,t}), \quad (2)$$

where α_a is the average propensity to consume out of resources of an individual aged a . In theory, this relationship is age-dependent, but independent of time.⁴ For an individual of age a at time t , his resources are the sum of his asset holdings, $w_{a,t}$, and the present value $h_{a,t}$ of his total non-capital income, $y_{a,t}^{NC}$. Non-capital income, $y_{a,t}^{NC}$, is the sum of labour earnings $y_{a,t}^L$, plus state, public (unfunded and funded) and private pension contributions and payments⁵, $y_{a,t}^P$, plus all net monetary transfers with the government $y_{a,t}^T$ and all benefits in kind, $y_{a,t}^K$; that is

$$y_{a,t}^{NC} = y_{a,t}^L + y_{a,t}^P + y_{a,t}^T + y_{a,t}^K.$$

Total income, $y_{a,t}$, is then the sum of non-capital income, $y_{a,t}^{NC}$, and capital income (the returns to wealth net of taxes), $y_{a,t}^C$. The present value of the individual's resources is estimated by assuming that the individual *expects* that his *relative age profile* of the distribution of all the different components of income remain constant over time. The *level* of these per capita resources will grow at the productivity growth rate g : for an individual aged a at time t , with current income $y_{a,t}$, his future income at time $t+s$ will be $y_{a+s,t+s} = (1+g_{t+s})^s y_{a,t}$. Of course, this assumption implies that our individuals are bounded-rational: the current cross-sectional profiles, with incurred cohort specific effects, are treated as expected profiles.⁶ The income streams are given at present value by assuming interest rates are constant and by making the necessary adjustments for current and future mortality rates. The net present value of income is therefore

$$h_{a,t} = \sum_{u=a}^{100} \left(\prod_{s=0}^{u-a} \frac{\mu_{t+s}}{1+r_{t+s}} \right) y_{u,t+u-a}^{NC} = \sum_{u=a}^{100} \left(\prod_{s=0}^{u-a} \frac{1+g_{t+s}}{1+r_{t+s}} \mu_{t+s} \right) y_{u,t}^{NC},$$

where r_s is real interest rate and μ_s is probability to survive another year being $s-1$ years old.

The aggregate consumption at time t is $C_t = \sum_a c_{a,t} n_{a,t}$ and the total resources are $R_t = \sum_a (h_{a,t} + w_{a,t}) n_{a,t}$. We define the net national saving rate as $SR_t = (Y_t - C_t - G_t)/Y_t$, where Y_t is the net national income. The decomposition of national saving rate under the life-cycle

⁴Farmer (1990) derives this solution to the stochastic choice problem with finite horizon assuming that individuals have Risk-Neutral Constant Elasticity (RINCE) preferences.

⁵We need to treat all pensions, private and state, as if they are run on the same basis. This facilitates comparisons across the countries. There are more details of this point later in the paper.

⁶We thus assume that all individuals form expectations conditioned on the same set of variables, that the individuals and the researcher have the same information set and that the researcher knows how individual expectations are formed.

theory yields

$$\begin{aligned}
SR_t &= 1 - \frac{G_t}{Y_t} - \left(\sum_a \alpha_a \frac{(h_{a,t} + w_{a,t}) n_{a,t}}{R_t/N_t} \frac{R_t}{N_t} \right) \frac{R_t}{Y_t} \\
&= 1 - \gamma_t - \left(\sum_a \alpha_a (\psi_{a,t} + \omega_{a,t}) p_{a,t} \right) \rho_t,
\end{aligned} \tag{3}$$

where $N_t = \sum_a n_{a,t}$ is total population. In the second line of formula (3) we used the new notation for the distribution of population, $p_{a,t} = \frac{n_{a,t}}{N_t}$, the distribution of non-capital resources, $\psi_{a,t} = h_{a,t} N_t / R_t$, the distribution of capital resources, $\omega_{a,t} = w_{a,t} N_t / R_t$, for the resource to income ratio, $\rho_t = R_t / Y_t$, and for the share of government consumption $\gamma_t = G_t / Y_t$.

Equation (3) can now be used to decompose differences in saving rates between countries into the four major components, caused by the difference in the following:

1. average propensities to consume, $\alpha_{a,t}$;
2. the demographic factors (the age distribution of the population $p_{a,t}$);
3. the total resources. We shall breakdown the total effect of resources into (a) the effect of age distribution component and (b) the level of resources component. The effect of life-time distribution of resources is also split into the effect of (i) non-capital resources $\psi_{a,t}$ and (ii) capital resources $\omega_{a,t}$. The non-capital resources are split into labour income $y_{a,t}^L$, net pension income $y_{a,t}^P$ and taxes and benefits, which, in their turn, are net government monetary transfers $y_{a,t}^T$ and benefits in kind $y_{a,t}^K$.
4. government consumption share, γ_t .

This decomposition, in a sense, presents total effect of different factors in a ‘reduced’ form. There are some causes, which affect more than one component. For example imperfect capital markets may affect both the propensity to consume and the decision to work and therefore resources. Similarly, if the inter-temporal elasticity of consumption is significantly different from one then interest rates may affect both the propensity to consume and the level of available resources. Importantly, an increase in productivity, resulting in higher real wage growth, may affect both the distribution of resources and the resource to output ratio. With higher expected real wage growth, the young increase spending. This reduces the national saving rate. However, over the longer run the resource to output ratio is likely to grow too, offsetting the effect. Our approach is unable to disentangle these effects. In this paper, we only attempt to quantify differences in terms of these six factors, and only discuss their possible causes.

Now, the last three factors are observable. This is in contrast to the first source, the average propensity to consume, which is derived. Hence, interpretation of the differences in saving rates due to differences in the average propensities to consume requires more thought.

Differences in the average propensity to consume (APC) between countries can be caused by a number of factors; Blanchard (1985) shows that the APC is a function of mortality rates and expected future interest rates, Jappelli and Pagano (1989) that it is affected by borrowing constraints, Banks et al. (1994) that it is a function of future family size and Caballero (1991)

that it is affected by the degree of income uncertainty. All three countries are very similar in some of these respects, and very different in others.

Both the UK and the US have fairly liberalised open capital markets, and have similar borrowing constraints. Italy, however, is different. In a series of papers, Jappelli and Pagano (1989), Guiso et al. (1992b), Guiso and Jappelli (1998), Jappelli and Pagano (1999) and Jappelli and Pistaferri (2000), the authors have investigated the effects of the tight capital markets on saving behaviour in Italy. They document extensively ‘the dearth of mortgage lending’ in Italy and the consequent need for Italians to finance their home purchases predominantly from accumulated savings. The reason for this ‘dearth’ is that Italian law makes it very difficult and therefore costly for a mortgage company to repossess a house should the borrower fall behind with repayments. The mortgage companies therefore require large downpayments to protect themselves against this eventuality. However nearly 61% of Italian households do succeed in raising the capital and are home-owners (Jappelli and Pagano (1999)), as compared to 68% in the UK and 65% in the US (Holmans (1994)). Jappelli and Pagano (1999) also document that in the late 1980s consumer credit as a percentage of consumption expenditure was also low in Italy, only 4% as compared to 10% and 20% in the UK and US respectively.

The presence of these borrowing constraints would unequivocally reduce the average propensity to consume. Having found that the average propensity to consume in Italy is significantly lower than in the UK and US, we shall therefore interpret this as an evidence in support of Jappelli and Pagano’s thesis that Italians, and especially young Italians, face more borrowing constraints than their peer groups in the US and UK.

The degree of income uncertainty exacerbates the effects of the borrowing constraints on the APC. Without borrowing constraints, an adverse income shock would result in borrowing in order to spread the effect of the shock over several periods. With borrowing constraints, households will accumulate a greater stock of precautionary savings, reducing consumption and APC. Guiso et al. (2002), Kapteyn and Panis (2003) and Das and Donkers (1999) argue that the US face more income uncertainty than Italy. In particular, Guiso et al. (2002) explicitly compare the subjective wage and employment risk in the two countries. They demonstrate that tighter regulation of Italian labor markets reduce substantially the employee’s perceived risk of job dismissal relative to the United States. Börsch-Supan (2003) ranks the UK in between the other two countries. Our approach does not allow us to disentangle the effect of borrowing constraints and the effect of income uncertainty on the APC. We return later to this point when we interpret our results.

Family size is another possible source of differences in the propensities to consume. The number of adults per household when the head of household is aged 45-65 is more than twice as high in Italy than in the UK and US (see Figure 1). The main reason is that in Italy many children choose to live with their parents until they can afford the downpayment on their house; see Guiso and Jappelli (1991). Given this is the cause, it can be argued that this difference in behaviour is also a result of imperfect capital markets. Now these living arrangements will affect the cohort specific propensities to consume. Assuming the young adults work and there are economies of scale in living together, then these arrangements will encourage individuals to reallocate their consumption from the ages of 20-30 and 45-65 when they are sharing to other periods of their lives when they are not. It will therefore reduce the estimates of the propensity

to consume at these ages and increase it at the others. As such it will partly offset the effects of the capital market restrictions. One would also expect that due to these living arrangements there is likely to be larger inter-generational transfers from the middle-aged to the young. We shall return to this later.

We do not expect any differences in APCs because of mortality rates, as they are almost identical in all three countries. We also assume that an individual's planning horizon is determined by known mortality rates.

Equation (3) can be used to decompose the difference in saving rates across time (Gokhale et al. (1996)) or, in our case, across countries. It expresses the saving rate of country A as a function of its cohort specific propensities to consume, α_a , the normalised distribution of their capital and non-capital resources, $\omega_{a,t}$ and $\psi_{a,t}$, the age distribution of its population, $p_{a,t}$, and level of available resources, ρ_t . Gokhale et al. (1996) suggest substituting out one of these constituent components with the respective quantity from country B . As the authors state, this would 'convey the potential importance of the different saving determinants', rather than giving a precise quantification of the size of the effect.

Decomposition (3), however, has the following drawback. When substituting components of human capital, we do not take account of the fact that if country A always had group B 's income expectations then they would now have very different holdings of assets and this, too, could have a significant bearing on the current national savings rate. In order to control for simultaneity of wealth accumulation, we later try to simulate wealth, given projected income distribution. This point is discussed in Section 5 of this paper.

We now start investigation of the difference in saving rates between our three countries using Gokhale et al.'s (1996) framework. Following their approach, we use a deterministic model, so we do not recognise uncertainty as a factor which would cause the difference in the saving behaviour. We ignore this issue in order to exploit the simple framework only; in this framework, effects of uncertainty are automatically attributed to the one or more factors we study. We also use a no-bequest life-cycle model and assume that parents do not draw utility from the time spent with children; we state categorically that this is not to suggest that other determinants of savings are unimportant, but that it provides a useful initial framework.

In the next section we discuss data construction and sources. We make the next section brief in order to move quickly to the results, and so we address some further data construction and measurement issues in Appendices A and B.

3 Data Sources and Measurement Issues

It is imperative in a cross-country study to take full account of all sources of income and expenditure⁷. It is not sufficient to concentrate only on household income and consumption, as generally recorded in the household surveys; it is also necessary to account for all benefits in kind as well as all monetary benefits. For example, in a country where higher education tuition fees are subsidised, students are much less likely to need to borrow and therefore personal sector saving rates are likely to be higher than otherwise. Similarly, in a country where health care

⁷An omission in a time series study of a component of income may not have a significant bearing on the results if it remains roughly a similar proportion of individual's income over time; in a cross country study it is unlikely that this component will constitute a similar proportion of the income of individuals in the different countries.

of the elderly is subsidised, people need to save less for their retirement and therefore savings rates are likely to be lower. Additionally, in some countries these transfers may be received as a money transfer, as is the case of Medicaid payments in the US, or as in kind benefits, as is the case for the health care provided by the NHS in the UK. There are large differences between countries in the size of such in kind payments, being almost 20% of consumption expenditure in the UK, around 15% in Italy and only 10% in the US; such differences are easily large enough to have a major effect on our results.

The necessity to account for all income in kind constrains us to work with cross-sectional data, for one particular year.

3.1 Data Sources

We work with the data for 1997. This year was chosen as it was the latest year for which we had data sources for all three countries of interest. We use representative cross-sectional surveys for each country to construct age profiles of all resources and consumption, and we benchmarked resulting distributions by age against national aggregates. This paper is accompanied by the detailed appendix Kirsanova and Sefton (2006) where we explain in details how each particular age profile was constructed. We also report the level of under/over-reporting in household surveys.

United Kingdom

Our main source for the aggregate data is Office for National Statistics (2000). For every item in the National Accounts we construct age profiles using major UK household surveys. Main sources of age profiles are the Family Resource Survey (FRS) and the Family Expenditure Survey (FES) which are repeated cross-section representative surveys of British households. We also use the British Household Panel Survey (BHPS) and the General Household Survey (GHS) data for the relevant year in order to check consistency of profiles. Additionally, we use age profiles constructed for the “Generational Accounting in the UK” project. The paper by Cardarelli et al. (2000) contains detailed appendix with all sources and methods for the government transfers and income in kind.

United States of America

We use the Bureau of Economic Analysis (1999) published by the Bureau of Economic Analysis and the Federal Reserve Board (2000) published by the Federal Reserve Board for the aggregate data. We also use the number of household surveys to construct age profiles. To construct the labour income data we use the Current Population Survey, to get profiles for the government benefits we use the Annual Statistical Supplement to the Statistical Bulletin, and to construct private pension profiles and the life insurance profiles we use the data of the American Association of Insurers. The Congressional Budget Office and the Health Care Financing Administration provide data on Medicare, Medicaid and education. We use the Survey of Consumer Finance to obtain profiles on financial wealth, and the Consumer Expenditure Survey to obtain consumption profiles.

Italy

Our main source of micro-data is the Bank of Italy’s Survey of Household Income and Wealth (SHIW) which is a representative repeated cross sectional survey of Italian households (see Jappelli and Pagano (1994), Jappelli and Pagano (1999) for the discussion). We also use data on disaggregated consumption from the National Statistical Institute (ISTAT) Survey on Household Consumption (SHC). Aggregate data are taken from the Italian National Accounts, ISTAT (2000).

We use data from the Generational Accounting research project (Cardarelli and Sartor (2000)) on government expenditures and income, which are obtained from various sources and discussed in the detailed appendix Kirsanova and Sefton (2006). We use the SHIW for consumption and wealth, including financial wealth.

3.2 Individuals vs. households

Following Gokhale et al. (1996) we treat individuals, rather than households, as the life-cycle decision makers. This approach is in line with recent research by Deaton and Paxton (2000). They argue that households are simply ‘veils’ for a group of individuals; households are transient entities that appear, transform and disappear through time. For example, one would not expect two households both with a head of household aged 45 to behave in the same way, if one of the heads is living on his own and another is married and supporting a 20 year old son and 70 year old mother. Therefore a model based on households as the basic economic unit would need to adjust for the household size, age of the household members and possibly their inter-relationships. Rather than attempt this difficult task, we chose to treat individuals as our basic unit. Deaton and Paxton’s (2000) research supports this approach as they found empirical support for the life-cycle model at the individual level, but hardly any evidence was found at the household level. We describe in Appendix A how we allocated the household consumption and wealth among adult members of the household.

3.3 Treatment of Private Pensions

In 1997, the three countries had different pension systems. The UK and the US had a similar mix of PAYGO state and funded private pensions arrangements. But in Italy nearly all individuals relied only on their PAYGO state pension; the value of private pension funds were negligible. Hence in the UK and the US, a large proportion of personal sector wealth was held as financial assets in funded pension reserves, whereas the size of these funds was minimal in Italy.

In our approach, in common with both Bosworth et al. (1991) and Gokhale et al. (1996), individuals do understand that mandatory pension contributions entitle them to benefits when old and so they are not ‘myopic’. This assumption is an essential first step, as Jappelli (2001) argues, if we are to account for differences in saving rates between countries.

However, there is an *accounting* issue. Both the European System of Accounts and the National Income and Product Accounts consider saving in private pension funds as part of personal sector saving, but mandatory saving in the form of social insurance is not. So, if countries have a very different mix of private and state pension arrangements, the measured personal sector saving rates will not be comparable across these countries. To correct for this, we must treat both types of pension savings in a similar manner.

This is relatively straightforward if we assume that the present value of contributions to any pension plan is equal to the present value of all pension payouts from the plan over the lifetime of a cohort. Given this condition is satisfied, we could treat all private pension saving as if they were contributions to a public PAYGO system, and all private pension receipts as if they were public pension income. Such a change would not affect our analysis if the present value of the two streams are equal. Alternatively we could treat all contributions to a public PAYGO system as private savings and ignore the public pension benefits (as they are to be treated as returns to the savings).

For the first approach, treating private pensions as a PAYGO scheme, we need aggregate data for contributions and payments, as well as for the amount of pension reserves. All these data are available for funded pensions.⁸ We can and do check that private pension schemes are roughly actuarially fair for the US and the UK. We therefore adopt the first approach for this pragmatic reason. It also has the advantage of reducing the size of potential measurement error as this approach does not require us to adjust the Italian accounts, only the UK and the US; an advantage because the national accounts for Italy are less detailed than the those for the US and UK. All private contributions are therefore *classified* as a tax and pension payments – as an income. In Section 3.4.3, we examine the validity of our assumption that the present value of contributions equals that of the to payouts.

3.4 Looking at the data

3.4.1 Demography

Demographic factors play a significant role in our empirical analysis, so we start with a discussion of the demographic differences between the countries. Distributions of population by age are plotted in the top panel of Figure 1. The distributions are all normalised so that y -axis measures the percentage of total population (of a given age). The major difference between the distributions is that Italians have much lower fertility rate than the other two countries. This results in a smaller percentage of children as a proportion of the population.

The next two panels show how the household composition changes with the age of the head of household. The family composition in the US and the UK is almost identical. In contrast in Italy, unsurprisingly given the first chart, there are fewer children in each household. However more importantly for our analysis is the difference in the number of adult children per household. In Italy, parents aged between 45 and 60 are twice as likely to be living with their adult children as in the UK or US. As mentioned earlier, Guiso and Jappelli (1991) argue that the principal reason for this difference is that many children choose to live with their parents until they can afford downpayment on their house.

3.4.2 Income

In Figure 2, we have plotted the per capita distribution of the components of non-capital income by age as a ratio of average per capita income. We have split income into the three components; gross labour income, $y_{i,t}^L$, private and state pension payments minus pension contributions, $y_{i,t}^P$,

⁸We could not do the other way, i.e. to reclassify state pensions as funded pensions, as we would need equivalent data for PAYGO system, and they are not available.

and all benefits whether in kind or monetary net of tax payments, $y_{i,t}^T$. We also look at two components of $y_{i,t}^T$ – monetary taxes and benefits, $y_{i,t}^{TM}$, and benefits in kind, $y_{i,t}^K$. In all cases the distributions are normalised by dividing through by average per capita income, Y_t/N_t . The reason for this split is that gross labour income can be seen as the basic return to labour and the other two components can be seen as inter-generational transfers implemented through either the pension system or the welfare state. The total net present value across the population of net pension income, $y_{i,t}^P$, is close to zero for all countries and the net present value of all welfare transfers is only slightly positive; the welfare state is in part funded by indirect taxes which are part of consumption expenditures. Therefore by analysing the transfers at this level, we will be able to measure how the individual country welfare and pension arrangements affect the personal sector saving rate.

The main observations from Figures 2 are:

1. Gross labour income is earned at markedly different times in the different countries: Italians and Americans start working later than Britons, and Americans retire on average over five years later. On their own, these data would suggest that both Italians and Americans would wish to borrow more when they are young and, further, Americans would also wish to save less for retirement as they tend to work longer.⁹
2. The pension payments in retirement are similar across the countries. However the Italians start drawing their pension one or two years earlier than the British and five to six years earlier than the Americans. The Italians also pay higher contributions to save for their longer retirement.
3. The tax and benefit system in the UK and the US effect a similar level of redistribution over an individual's lifetime. In contrast the degree of redistribution from young to old is more severe in Italy. We have plotted benefit income net of indirect *and* direct taxes; therefore the measured levels of redistribution are independent of the particular choice of taxation.
4. Benefits in kind for the old in Italy are drastically lower than they are in any other country. Benefits in kind predominantly consist of health expenditures and spending on education for the young. The lower level of benefits in kind in Italy, however, is partially compensated by higher monetary benefits for the old.

3.4.3 Consumption, Wealth and Average Propensities to Consume

The first panel of Figure 3 plots the normalised consumption profiles. There are also some noticeable differences between the countries. In the US, individuals choose to consume the most when they are aged between 50 and 55; in both Italy and the UK, when they are aged between 40 and 50. In Italy there is also a very pronounced peak in the profile around the age of 40. The shape of this profile in Italy can be explained by the family composition, which was discussed above. In Italy, when the parents are aged between 45 and 65, they are almost twice as likely to have their adult children, aged between 20 and 30, living with them as compared to their

⁹In part, this later retirement is caused by eligibility for medical help programmes.

peers in the UK and US. If there are any economies of scale in the household, this will cause individuals to reallocate their consumption from the ages of 20-30 and 45-65 to other periods of their lives, namely to ages of 30 - 45 and after 65, when there are no such economies.

The second panel of Figure 3 plots the normalised distribution of total asset holdings¹⁰ by age for the three countries. Three observations can be made: first, Italians start saving significant amounts earlier than either their US or UK peers; second, Americans delay their savings with compared to the British; third, the Americans, aged between 50 and 65 also save considerably more of their income than their counterparts in the UK and US. Therefore, there are large differences in the wealth profiles in the three countries; Americans and Italians save more than the British for their retirement but the Italians start this saving much earlier than their American counterparts. It is worth noting that total wealth holdings fall with age after retirement.¹¹ In the third panel of Figure 3, we have plotted the estimated age-specific propensities to consume. These are computed as age-specific consumption divided by total age-specific resources, under the assumption that all pensions are reclassified on the PAYGO basis (see formula (2)).

Age-specific total resources is a sum of the age-specific non-human wealth and human wealth. Non-human wealth includes all assets (financial and real) and the human wealth is computed as net present value of all future earnings, as described in Section 2.

In the US and the UK, the propensities to consume are almost identical. This can be regarded as an informal test of the life-cycle model. Both countries have similarly developed capital markets, similar flexible labour markets, similar household composition and mortality rates. Therefore, under the pure life cycle model the age-specific propensities to consume should be similar. This is observed despite the income and wealth profile being markedly different in these countries.

The cohort specific propensities to consume in Italy are significantly lower for all age groups before retirement. As we have argued earlier, we will regard this difference as an evidence of the tight capital markets in Italy affecting individual saving behaviour. Young adults save more than they would like to because they are unable to borrow. This evidence supports the conclusions of Jappelli and Pagano (1999) and Jappelli and Pistaferri (2000) who argue that the heavy downpayment requirements for first time home-buyers force young adults to save.

As discussed in Section 2, average propensities to consume are affected by income uncertainty, and the effect of income uncertainty is bigger, the bigger the effect of borrowing constraints. Guiso et al. (2002), Kapteyn and Panis (2003) and Das and Donkers (1999) discuss that the US face more income uncertainty than Italy. (Guiso et al. (1992a) also argued that a precautionary motive in Italy was not a big explanatory factor.) Börsch-Supan (2003) ranks the UK in between the other two countries. This suggests that if we were able to ‘remove’ the effect of income uncertainty for every country, the gap between British and Italian average propensities to consume would become wider.

Figure 4 plots the estimate of the APCs in both the US and UK first assuming that the private pensions system is treated as if it were a PAYGO system and, second, treating it as a funded system. The estimates are very close¹², which indicates that any measurement error

¹⁰ Assets do not include private pension wealth.

¹¹ In the absence of cohort effects, this would suggest that there is a significant amount of dissaving in retirement.

¹² Pension wealth profile is computed in assuming that individuals contribute percentage of their gross labour income (which grows at rate g relatively to the currently observed cross-sectional profile) until they reach statutory

generated here is not likely to change our conclusions.

4 Decomposition of the National Saving Rates

We are now ready to demonstrate the main result of this paper. We use the approach suggested by Gokhale et al. (1996) and described in Section 2. We use formula (3) but we need to adapt it for our purposes. We assume that only consumers above the age of 19 are decision-makers. Therefore, as discussed above, monetary consumption of children had to be attributed to their parents, which was done for every household in micro-surveys. However, we could not do it with children's consumption of benefits in kind, as we only had aggregate distributions of them by age, so these benefits remained attributed to children. The final formula which we use can be written as:

$$SR_t = 1 - \frac{G_t}{Y_t} - \frac{B_t}{Y_t} - \left(\sum_{a=19}^{100} \alpha_a \frac{(h_{a,t} + w_{a,t})}{R_t/N_t} \frac{n_{a,t}}{N_t} \right) \frac{R_t}{Y_t} \quad (4)$$

$$= 1 - \gamma_t - \beta_t - \left(\sum_{a=19}^{100} \alpha_a (\psi_{a,t} + \omega_{a,t}) p_{a,t} \right) \rho_t. \quad (5)$$

where Y_t is the national net disposable income, N_t is the total population, $\gamma_t = G_t/Y_t$ is the share of government consumption, $\beta_t = B_t/Y_t$ is the ratio of benefits in kind, allocated to children, to the national income; and all other variables describe age distributions and total resources of adult population, as in formula (3).

Table 4 presents the results of the decomposition of the differences in the personal sector savings rates between the countries. All projections are computed using the same constant productivity growth rate. The results have been presented as a breakdown of the difference of the saving rate in the US and Italy relative to the UK. The difference in rates is due to a sum of several effects, some of them are large and work in different directions.

The principal conclusions from this analysis are:

1. The primary reason for the low saving rate in the US as compared to the UK can be attributed to the difference in income profiles of the two countries; these are plotted in Figure 2. There are two stark differences between these profiles. First, the young Americans have a much lower incomes relative to their incomes in middle age than their UK peers. The life-cycle model would predict that they would therefore wish to borrow considerably more than their UK peers in their early working life. This would reduce the national saving rate. Second, Americans retire on average 5-6 years later than their UK peers, and so need to save less for their shorter retirement. This effect is partially offset by the pension transfers which also start later in their lives.
2. The principal cause for the high national saving rate in Italy as compared to the UK is due to the difference in the profiles of the age-specific average propensities to consume. As we have argued, we attribute this difference to the binding borrowing constraints, particularly

pension age (different for males and females and for different countries). Then their resources are annuitised and periodical pension payments are paid. The level of these periodical payments is computed in assuming currently observed mortality rates, and it is adjusted for the growth rate of standards of living, g .

in the housing market in Italy, which reduces the ability of Italians to borrow. Borrowing constraints reduce unequivocally their average propensities to consume. The analysis also suggests that if these borrowing constraints were relaxed, Italians would probably borrow more than their UK peers in their early life though this would be partially offset by their less generous pension system.

3. The difference in demography between the countries can explain very little of the difference in saving rates. Some researchers have suggested that the US saving rates is currently very low relative to the past because of the present preponderance of the baby-boom generation; however as all three countries experienced a similar baby-boom in the mid 1960s, this fact can not explain the *differences* in saving rates across our countries.
4. The results also suggest that in the US, the national saving rate is higher relative to the UK because of the differences in the tax and benefit systems. The difference cannot be explained by the different health care systems – the effect of benefits in kind is small. It is the *timing* of benefits, related to the statutory retirement age, that causes most of the differences. It is possible that people prefer to work longer (and thus the profile of the labour income is shifted to the right) in order to qualify for the benefits. However, on average Americans pay less taxes and get less benefits when they are old, which encourages saving.

As Gokhale et al. (1996) emphasise, these results ‘only convey the potential importance’ of various factors affecting personal sector saving behaviour. As we stressed earlier, a single economic ‘cause’ might affect two or more of our measured factors. The most obvious example, to which we devote considerable attention to in the next section, is the obvious link between differences in the saving rates attributed to APCs and to the wealth profiles. The following illustrates the point. Assume that either income uncertainty is lower or borrowing constraints are tighter in Italy. Both are likely to reduce the young Italians’ propensity to consume. Given their lower consumption, they will accumulate greater wealth at a younger age. Our analysis relates their higher savings rate to their lower APC. However their lower APC leads to a greater wealth accumulation which increases their consumption (the wealth effect) and reduces their savings rate *ceteris paribus*. Our analysis will therefore identify an increase in savings due to the lower APCs but will also identify a decrease in savings due to the increase in per capita wealth holdings; this latter effect will partly offset the former. However, both have the same root cause. Table 4 illustrates this issue clearly. The differences in the savings rates associated with the differences in the APC are clearly inversely correlated to the ones associated with the differences in the wealth. Gokhale et al. (1996) make a similar observation with respect to the old. They note that the rise in the average propensity to consume in old age is inversely related to amount of wealth. This inter-reaction arises because the consumption and wealth profiles are not independent but are jointly determined. For a given income stream and interest rates, then choosing a path for consumption determines the path for wealth (via the wealth accumulation equation) and visa-versa.

In the next section we address this issue. As before we look in turn at a differences in either the age distribution of non-capital resources, or in the age-specific propensities to consume. For

each case we first estimate the change in wealth holdings $\omega_{a,t}$ induced by a change in any of these profiles. We then estimate the joint impact of changing both the profile and the wealth distribution, in line with this estimate, on national savings. This gives an estimate of the overall impact on national savings that takes in account the joint determination of consumption and wealth.

In addition, this approach also allows us to estimate how much of the distribution of wealth holdings by age cannot be explained by either differences in the age distribution of non-capital resources, or differences in the APCs. We suggest that differences in the both the size and timing of inter-generational private transfers might account for any residual differences. Though we feel this interpretation is instructive, we also stress that these estimates of the size of inter-generational transfers are only rough and so we exercise a healthy degree of caution.

5 Further Investigations

Before describing how we estimate the differences in the wealth profiles induced by a difference in either the distribution of non-capital resources or age-specific propensities to consume, we need to look at the wealth accumulation equation at a cohort level. This can be written

$$w_{a+1,t+1} = (1 + r_t)w_{a,t} + y_{a,t}^{NC} - c_{a,t} + t_{a,t} \quad (6)$$

where r_t is the real return on wealth and term $t_{a,t}$ is a residual income term. In what follows, we shall equate this source of residual income with inter-*vivos* transfers and bequests, or more precisely private intergenerational transfers. Intergenerational transfers are not recorded in the national accounts as they are transfers within the personal sector from one generation to another and so net out in aggregate.¹³ However, the conventional view is that such transfers are considerable but are difficult to estimate accurately, see, among others, Wolff (1999), Guiso and Jappelli (1991) and Guiso and Jappelli (1998).

We propose estimating these transfers from two years of cross-sectional wealth data for wealth, benchmarked to national accounts aggregates in that year. We cannot stress too strongly, that estimation of any quantity as a residual is always problematic because of accumulation of measurement errors. In our case, the main source of errors is likely to be either from errors in the estimates of the relative age profile of wealth or from estimates of the real return in the year of interest. In the accompanying working paper, Kirsanova and Sefton (2006), we perform a couple of checks on these estimates. Firstly we check whether the *implied* real interest rate in the aggregate wealth identity is equal to the observed real return in that year. Secondly, under the assumption that those who die in any year have the same average level of wealth as those who survived¹⁴, we check whether these profiles of transfers can generate the observed level of bequests. The data do broadly satisfy these tests. Even so, we shall not labour our interpretation. However some analysis is informative.

¹³In theory they could be included in the personal sector accounts as transfers in both the resources and uses accounts. However the difficulty in measuring them makes this almost impossible.

¹⁴In reality, this condition is unlikely to be strictly satisfied. The correlation between income and life expectancy has been well documented, see for example Kaplan et al. (1996).

5.1 Intergenerational Transfers

In the top panel of Figure 5, we present our estimates of inter-generational private transfers, normalised by per capita income. As it would be expected, the young receive and the old give. The amount of money transferred is large. However a large proportion of these transfers will be *intra*-household. So for example young Italians, who tend to live with their parents to a much later age see Figure 1, tend to receive more than their UK and US peers. On the converse side, in Italy adults over 45 are net givers to other generations (to their children) whereas in the UK and US these generations are still receiving from the older generations. The amounts transferred on average are the smallest in the UK. In the US, individuals aged between 60-70 transfer a sizeable proportion of their income to younger generations.

The estimated size of these private inter-generational transfers in the US is high. Our estimates are larger than the estimates given in both Wolff (1999) and Gale and Scholz (1994); however the two are not directly comparable. As we mentioned, our figures include *intra*-household transfers whereas the figures of Wolff (1999) and Gale and Scholz (1994) do not. Further, we also believe that Wolff's approach would have underestimated the level of inter-*vivos* transfers. He chose to estimate the cohort-specific saving rates from the Consumer Expenditure Survey (CEX). However, as Slesnick (1992) shows, the CEX survey underestimates consumption by almost 30% whereas income is barely underestimated. Hence the age-specific saving rate will be over-estimated, and thus estimates of inter-*vivos* transfers are biased down.

It is interesting to see how an account for inter-generational private transfers alters estimates of age-specific savings rates. We define disposable income of an individual aged a as $y_a^d = y_a^{NC} + rw_a$. The age-specific savings rate, not taking into account these transfers, is defined as $(y_a^d - c_a) / y_a^d$. This definition includes all returns to wealth, capital gains and capital income. It therefore differs from the national accounting definition but it does ensure comparability across countries. In contrast, we define the age-specific savings rates taking into account inter-generational transfers as $(y_a^d + t_a - c_a) / (y_a^d + t_a)$.

Panel two in Figure 5 plots the age-specific savings rates ignoring any inter-generational private transfers. The young in both Italy and America consume considerably more than their income in their early lives. In Britain this trait is less marked, principally because they earn more, see Figure 2, rather than spend less. In Italy, all cohorts from age 25 until retirement, save considerably more than their peers in the other two countries. After retirement, all cohorts in all countries are savers as they consume less than their income.

In the third panel of Figure 5 we plot age-specific savings rates once inter-generational private transfers have been included as part of income. This profiles can be understood as being consistent with the distribution of wealth by age. They suggest that all cohorts save until retirement and dis-save afterwards, and hence are in line with predictions from the standard life-cycle model of savings. Young adults in Italy, though, still save far more than their counterparts in the US and the UK.

5.2 Adjusting for the joint determinacy of consumption and wealth

In this section we discuss an approach to controlling for the joint determination of consumption and wealth holdings. We try to estimate the changes to the age distribution of capital resources induced by changes to the age distribution of non-capital resources, or by changes in the age-

specific propensities to consume. Inevitably this requires making further assumptions. Among these, the most critical is that the parameters of the model are stable over time. Clearly this is a strong assumption and is unlikely to be satisfied precisely. Despite these obvious problems, we believe the analysis does provide some further insight. For this reason this analysis must be viewed as a complement to, rather than a substitute for, the analysis in Section 2.

Formally, we assume that all generations, which are alive in $t = 1997$, have previously faced the same growth adjusted non-capital income profile. Namely, an individual born in $t - s$ at time $t - s + a$ (i.e. aged a) has income of:

$$y_{a,t+a-s}^{NC} = (1 + g)^{a-s} y_{a,t}^{NC}, \quad (7)$$

where $y_{a,t}^{NC}$ is the cross-sectional income distribution in 1997. Therefore the present value of an individual's non-capital income at time $t - s + a$ can be computed as

$$h_{a,t+a-s} = \sum_{u=a}^{100} \frac{(1 + g)^{u-s}}{(1 + r)^{u-a}} \kappa_u y_{u,t}^{NC}, \quad (8)$$

where $\kappa_a = \prod_{i=1}^a \mu_i$ is the probability of the individual being alive at age a .¹⁵ We now use our life-cycle model of consumption to simulate the wealth profile. To describe this simulation process, denote the simulated consumption and wealth of an individual aged a in year t as $\hat{c}_{a,t}$ and $\hat{w}_{a,t}$ respectively. If we initialise the wealth profile at $\hat{w}_{0,t-s} = 0$ for all s , then we simulate the implied wealth profile iteratively using the formulae:

$$\hat{w}_{a,t+a-s} = \sum_{u=1}^{a-1} (1 + r)^{a-u} (y_{u,t+u-s}^{NC} - \hat{c}_{u,t+u-s}), \quad (9)$$

$$\hat{c}_{a,t+a-s} = \alpha_a (h_{a,t+a-s} + \hat{w}_{a,t+a-s}). \quad (10)$$

where it is assumed that the real interest rate r and growth rate g are constant. Some straight-forward algebra shows that the difference between the implied profiles and the observed profiles in year t is the accumulated return to the inter-generational private transfers discussed in the previous section,

$$w_{a,t} - \hat{w}_{a,t} = \sum_{u=1}^{a-1} (1 + r)^{a-u} t_{u,t+u-a}. \quad (11)$$

We shall therefore refer to this residual wealth profiles (the wealth accumulation that can not be explained by our simple simulation model) as the accumulated value of private inter-generational transfers.

We are now in a position to describe how we can decompose the differences in the saving rates between two countries, country A and country B , taking into account the joint determination of consumption and savings. As before, we replace the profile from one country by the profile from another country. However as these profiles are measured in different units, they must first be

¹⁵This analysis effectively assumes that all transfers are unanticipated, as they are not been included within the estimate of the present value of all non-capital income. Although in reality some of these transfers might be anticipated (see Poterba (1994) and Guiso and Jappelli (1998)), we ignore this issue here. The associated working paper Kirsanova and Sefton (2006) investigates this issue in more detail.

normalised. In section 4, we followed Gokhale et al. (1996) and normalised by dividing through by average resources per capital, R_t/N_t . However, as resources, R_t include aggregate wealth, this factor is no longer constant across our simulations. Instead we therefore normalise by dividing through by average labour income at age 35, $y_{35,t}^L$. This implies that our decomposition of the savings rates is now in the form

$$SR_t = 1 - \frac{G_t}{Y_t} - \frac{B_t}{Y} - \left(\sum_a \alpha_a \frac{(h_{a,t} + w_{a,t})}{y_{35,t}^L} \frac{n_{a,t}}{N_t} \right) \frac{y_{35,t}^L}{Y_t/N_t}.$$

As the ratio of labour income at age 35, $y_{35,t}^L$, to net national income per capita, (Y_t/N_t) , is almost the same for all three countries (see Figure 2, top panel), normalising by labour income at age 35, $y_{35,t}^L$ ensures that changes in the saving rates due to changes in the profiles can be interpreted as changes in the distribution.¹⁶ Once profiles are normalised, we can replace the profile of country A by the corresponding normalised profile of country B . We then simulate a new implied wealth distribution $\hat{w}_{a,t}$ with this profile; denote this as $\hat{w}_{a,t}^*$. Our final implied wealth profile is this simulated profile plus the accumulated value of private inter-generational transfers, i.e.

$$\hat{w}_{a,t}^* + \sum_{u=1}^{a-1} (1+r)^{a-u} t_{u,t+u-a}. \quad (12)$$

We now repeat the analysis of section 4 as before except that now we substitute out the relevant profile with the normalised profile from the other country and further the wealth profile $w_{a,t}$ with the simulated profile in equation (12).

5.3 Results

Table 5 records our results from this experiment. For example, the entry in the first column and the first row suggests that if Britons had the same average propensity to consume as the Americans, the British national saving rate would be 1.20% higher. We observe that all conclusions from the analysis in Section 4 are robust to this new approach. The differences in savings rates attributable to the different factors have similar relative, but slightly smaller, magnitudes; this is because we are now measuring the sum of the direct impact of the differences plus the offsetting impact of the induced changes in wealth. Thus our broad conclusions from Section 4 remain unchanged.

This table also includes results of a final check of this approach. We investigate how closely our profiles are able to reproduce the observed wealth to income ratios in each country in 1997. This data is recorded in the last line of Table 5. For every cohort alive we simulate the wealth holdings as of 1997, using the model in Section 5.2. (For this exercise, it is important to treat employers' contributions to private pension funds as part of income, see the lengthy discussion in Section 3.3). We then use the 1997 population distribution to obtain aggregate wealth to labour income ratio. These simulated income to wealth ratios are recorded in the penultimate

¹⁶ Another reason for choosing to normalise the profiles by labour income at age 35, $y_{35,t}^L$ is that labour income at age 35 can be regarded as being approximately independent of any differences in retirement ages or tertiary education arrangements between countries. Therefore income at this age, at least approximately, can be considered exogenous to the model.

line of Table 5. For interest rates of 5%, we can match the observed wealth to income ratios in the UK and Italy. Our model under-predicts the observed income-wealth ratio in the US. The most likely explanation for this under-prediction is the high equity returns over the period 1995–1998. If we either use a US wealth profile generated from 1995 data to estimate our profile of inter-generational transfers, or we calculate the wealth- income ratio assuming interest rates are 7%, we are able to closely match the observed US wealth to income ratio¹⁷.

6 Conclusions

We believe that this paper offers two contributions to the literature. The first is ‘descriptive’; using a unified accounting framework and a wide variety of survey data sources, we compiled a complete profile of the average level of all incomes and expenditures of a typical individual by age and gender (including all income in kind such as government education and health expenditure). This allows us to visualise differences in consumer behaviour in the UK, US and Italy.

Our second contribution is ‘normative’; we attempted to quantify and explain differences in saving behaviour, as measured by national saving rates. Using the life-cycle framework we are able to answer the following question – if an average Italian expected to receive the same income over his lifetime as an American (or British) would he or she save more or less than the average American (or British).

Our work suggested that US saving rates are lower predominantly because of the difference in retirement ages. The average American tends to work on average almost six years longer than the average Briton or Italian. As expected lifetimes are almost identical in each of these countries, the average American needs to save less.

To explain the difference between the UK and Italy we focused on a very different mechanism. All the evidence suggested that the Italians saved more than the British because they were unable to borrow, particularly when they were young. In Italy capital markets, and especially the mortgage market, are far more restrictive than in the UK.

We also revealed the insignificance of some other, potentially important, factors. We found that demography could explain little of the observed differences in saving rates. This is not surprising, since the current demography in all three countries is very similar. Though our countries have very different tax and benefit systems, we found that each of these systems implicitly imposed a similar amount of inter-generational redistribution. This implies that the contrasting tax and benefit systems are unlikely to be the cause of the observed differences in saving rates.

¹⁷See the associated working paper, Kirsanova and Sefton (2006), for a more thorough discussion

A Allocation of Household Consumption and Wealth

The practical problem when treating individuals, rather than households, as a decision making unit, is how to allocate household consumption, income and wealth among the adult members of a household. For descriptive purposes we shall make the following definitions. All individuals aged 18 or younger are treated as dependent children¹⁸, the head of households and their partners, if any, are called the principal adults, and any other adults in the household are called dependent adults. We shall start by describing the allocation of consumption. All consumption is allocated among all adults and children using the following age equivalence scale. The consumption level of a newborn baby was assumed to constitute 30% of that of an adult, and this proportion increased linearly until by the age of 18 a dependent child was assumed to consume as much as every other adult in the household. After allocating all consumption in this manner, the consumption of all dependent children was then reallocated equally between the principal adults.

The allocation of wealth is done differently. All housing wealth is distributed equally between the principal adults whereas financial wealth is distributed equally among all adults except for those younger than 30 and in full time education.

Finally, income is allocated wherever possible to the individual who was receiving it. For those cases, such as housing benefit, where there is no clear benefactor the income is divided equally among the principal adults.

To clarify this allocation scheme consider the following example: a household consists of a working head of household aged 55, a partner aged 50, their working son of 25, a student daughter of 22, a schoolboy of 8 and a parent of the head of household aged 80. We assume the annual consumption of the household is 100, their total financial wealth is 1000 and their housing assets are worth 2000. Line 1 of Table 3 gives the ratio of consumption using the age equivalence scale; line 2 gives the initial allocation of consumption according to this equivalence scale and line 3 gives the final consumption allocation. The final two lines give household allocation of financial and housing wealth.

A possible problem with this allocation scheme is that it may overestimate the wealth of younger generations by assigning them too high share of the household wealth. But our method is consistent across countries, and we do control for non-earners.

B Further Measurement Issues

B.1 Labour Income and Operating surplus

It is often impossible to breakdown the value added of unincorporated business into the return to capital and the return to labour; this inevitably increases the error in estimates of both the return to wealth and the labour income. As a solution to this problem, we assume for all countries that 70% of the total income from unincorporated business could be regarded as labour income, and the rest is pooled with operating surplus.

¹⁸We ignored the odd households where the head of household was 18 or younger.

B.2 Health Care

The majority of the medical services in the UK and Italy are provided via the NHS as income in kind and financed by taxes. In the US, on the other hand, employers contribute to the group medical insurance and these contributions are classified as ‘other labour income’, similar to social security contributions. The Americans then pay cash for medical services and receive reimbursement for these expenditures later. Group insurance involves people of working age, with similar risks, so the age profile of contributions and payments should be roughly the same. In order to bring American accounts in consistency with other countries’ national accounts, we add two extra items into American National Accounts – additional ‘tax’ payments and additional ‘benefits in kind’; we also treat those medical consumer expenditures, which are reimbursed, as consumption in kind, as we do for the other two countries. When changing classification, we implicitly assume that different ways of health finance create the same level of ‘income and consumption uncertainty’. But we are not able to investigate effect of uncertainty in our framework.

B.3 Age Distribution of Payments from Private Pension Funds

In the British and American household surveys, households only report periodical pension payments, but not the surrender and refund values. In Britain, the surrender and refund values constitute about a third of all private pension payments in the National Accounts and have to be attributed to the younger households. We use the data from the Association of British Insurers on private pensions and assumed that the decision to surrender is most commonly associated with divorce, so we used divorce statistics to construct age profiles. We give more details in Kirsanova and Sefton (2006) on this allocation. We use the same methodology to allocate surrender and refund values from American pension funds.

Table 1: Sectoral Decomposition of National Savings in 1997 by Country

		Total Economy	Household & Non-Profit Institutions	Corporate Sector	Public Sector
United Kingdom (£ mln)	Gross Operating Surplus*	236,526	58,104	165,946	12,476
	Labour Income ⁺	461,637	461,637	-	-
	Net Property Income	11,087	40,838	-6,499	-23,252
	Taxes on Production	104,725	-	-	104,725
	<i>Gross National Income</i>	813,974	560,578	159,447	93,949
	Taxes and Social Contrib.	452	-180,309	-1,101	181,862
	Social Benefits	-564	164,348	-48,610	-116,302
	Net Other Transfers	-2,343	11,411	89	-13,843
	Social Benefits in Kind	-	88,450	-	-88,450
	<i>Gross Disposable Income</i>	811,519	556,028	109,825	57,216
	Collective Consumption	-59,958	-	-	-59,958
	Individual Consumption	-517,909	-517,909	-	-
	Social Benefits in Kind	-88,450	-88,450	-	-
	<i>Gross Saving</i>	145,202	38,119	109,825	-2,742
	Depreciation	-94,524	-22,043	-62,382	-10,099
	<i>Net Saving</i>	50,678	16,076	47,443	-12,841
United States (\$ bn)	Gross Operating Surplus*	1,813	215	1,417	181
	Labour Income ⁺	5,182	5,182	-4	-
	Net Property Income	767	1,055	96	-384
	Taxes on Production	664	-	37	627
	<i>Gross National Income</i>	8,422	6,453	1,546	423
	Taxes and Social Contrib.	-	-1,077	-238	1,306
	Social Benefits	-	19	-72	-91
	Net Other Transfers	-40	-21	-9	-10
	Social Benefits in Kind	-	1,148	-261	-887
	<i>Gross Disposable Income</i>	8,383	6,484	966	933
	Collective Consumption	-773	-	-	-773
	Individual Consumption	-4,940	-4,940	-	-
	Social Benefits in Kind	-1,148	-1,148	-	-
	<i>Gross Saving</i>	1,522	396	966	159
	Depreciation	-1,010	-250	-579	-181
	<i>Net Saving</i>	512	269	264	-21
Italy (Lira bn)	Gross Operating Surplus*	699,999	220,944	454,422	24,633
	Labour Income ⁺	1,060,819	1,060,819	-	-
	Net Property Income	-18,251	379,121	-223,299	-174,073
	Taxes on Production	223,000	-	-	223,000
	<i>Gross National Income</i>	1,965,567	1,660,884	231,123	-73,560
	Taxes and Social Contrib.	211	-588,589	-34,297	623,097
	Social Benefits	546	403,335	-58,652	-344,137
	Net Other Transfers	-7,746	-18,748	6,055	4,947
	Social Benefits in Kind	-	163,428	-	-163,428
	<i>Gross Disposable Income</i>	1,958,578	1,620,310	144,229	194,039
	Collective Consumption	-197,103	-	-	-197,103
	Individual Consumption	-1,167,846	-1,167,846	-	-
	Social Benefits in Kind	-163,428	-163,428	-	-
	<i>Gross Saving</i>	430,201	289,036	144,229	-3,064
	Depreciation	-256,754	-81,799	-150,681	-24,274
	<i>Net Saving</i>	173,447	207,237	-6,452	-27,338

Note: * – includes Mixed Income; ⁺ – includes Wages and Employer's Social Contributions.

Table 2: Saving and Spending Rates

	UK	US	Italy
Net Household Saving Rate, $((Y - C - G)/(Y - G))$, %	7.7	7.8	11.5
Net National Saving Rate, $((Y - C - G)/Y)$, %	7.1	6.9	10.2
Net Government Spending Rate (G/Y) , %	8.4	10.5	11.6
Rate of Government Spending in Kind on Children, (B/Y) , %	5.2	4.6	5.8

Sources: Bureau of Economic Analysis (1999), Office for National Statistics (2000), ISTAT (2000) and authors' calculations.

Table 3: Allocation scheme for a household's consumption and wealth

Relation to head	Child 1	Child 2	Child 3	Partner	Head	Parent of Head	Total
Age	8	22	25	50	55	80	
Source of income	–	–	work	–	work	pension	
Consumption weight	0.6	1	1	1	1	1	5.6
Preliminary consumption allocation	10.7	17.86	17.86	17.86	17.86	17.86	100
Final consumption allocation	0	17.86	17.86	$17.86+10.7/2$	$17.86+10.7/2$	17.86	100
Financial wealth allocation	0	0	250	250	250	250	1000
Housing wealth allocation	0	0	0	1000	1000	0	2000

Table 4: Decomposition of the differences in National Savings Rates between Countries

	UK	US	IT	US	IT
<i>interest rate</i>		$r = 3\%$		$r = 5\%$	
National Savings Rate (NSR)	7.1	6.9	10.2	6.9	10.2
Difference with UK NSR		-0.13	3.12	-0.13	3.12
<i>of which:</i>					
1. Average Propensity to Consume, $\alpha_{a,t}$		1.85	9.61	1.89	10.52
2. Demographic factors, $p_{a,t}$		-1.01	0.64	-1.01	0.64
3. Total Resources		1.09	-5.47	0.97	-6.93
<i>of which:</i>					
3a. Level of Resources, ρ_t		0.41	-2.50	0.91	-4.73
3b. Distribution of Resources		0.68	-2.88	0.06	-2.08
<i>of which:</i>					
3bi. Non-Capital Resources, $\psi_{a,t}$:		3.28	7.15	2.81	9.61
Labour income, $y_{a,t}^L$		-14.34	-1.73	-13.22	-0.59
Net pension income, $y_{a,t}^P$		9.12	2.53	8.25	3.74
Taxes and Benefits:		8.51	6.35	7.78	6.46
Net monetary transfers, $y_{a,t}^T$		10.26	2.50	9.94	3.03
Benefits in kind, $y_{a,t}^K$		-1.76	3.85	-2.17	3.43
3bii. Capital Resources, $\omega_{a,t}$		-2.60	-10.03	-2.75	-11.69
4. Government Expenditures, γ_t		-2.12	-3.22	-2.12	-3.22
5. Benefits in kind allocated to children*, β_t		-0.64	0.60	-0.64	0.60

Table 5: Decomposition of the differences in National Savings Rates between Countries allowing for the joint determinacy of consumption and wealth.

	UK	US	IT	UK	US	IT
<i>interest rate</i>		$r = 3\%$		$r = 5\%$		
National Savings Rate (NSR)	7.1	6.9	10.2	6.9	10.2	
Difference with UK NSR		-0.13	3.12	-0.13	3.12	
<i>of which:</i>						
1. Average Propensity to Consume, $\alpha_{a,t}$		1.20	6.25	1.29	8.08	
2. Demographic factors, $p_{a,t}$		0.05	-0.23	0.39	-0.20	
3. Non-capital resources		1.94	9.04	1.12	9.54	
<i>of which:</i>						
Labour income, $y_{a,t}^L$		-19.31	-2.35	-20.5	-2.86	
Net pension income, $y_{a,t}^P$		8.59	4.35	8.20	4.82	
Taxes and Benefits:		8.33	7.29	7.79	7.18	
Net monetary transfers, $y_{a,t}^T$		10.74	3.85	10.38	4.03	
Benefits in kind, $y_{a,t}^K$		-2.30	3.40	-2.46	3.09	
Inter-vivos transfers, $t_{a,t}$		1.13	-0.81	1.08	-0.61	
4. Government Expenditures, γ_t		-2.12	-3.22	-2.12	-3.22	
5. Benefits in kind allocated to children, β_t		-0.64	0.60	-0.64	0.60	
Simulated Wealth to Income Ratio	3.5	1.8	5.5	4.8	2.6	8.3
For reference: Wealth to Income Ratio in 1997	4.7	4.4	9.1	4.7	4.4	9.1

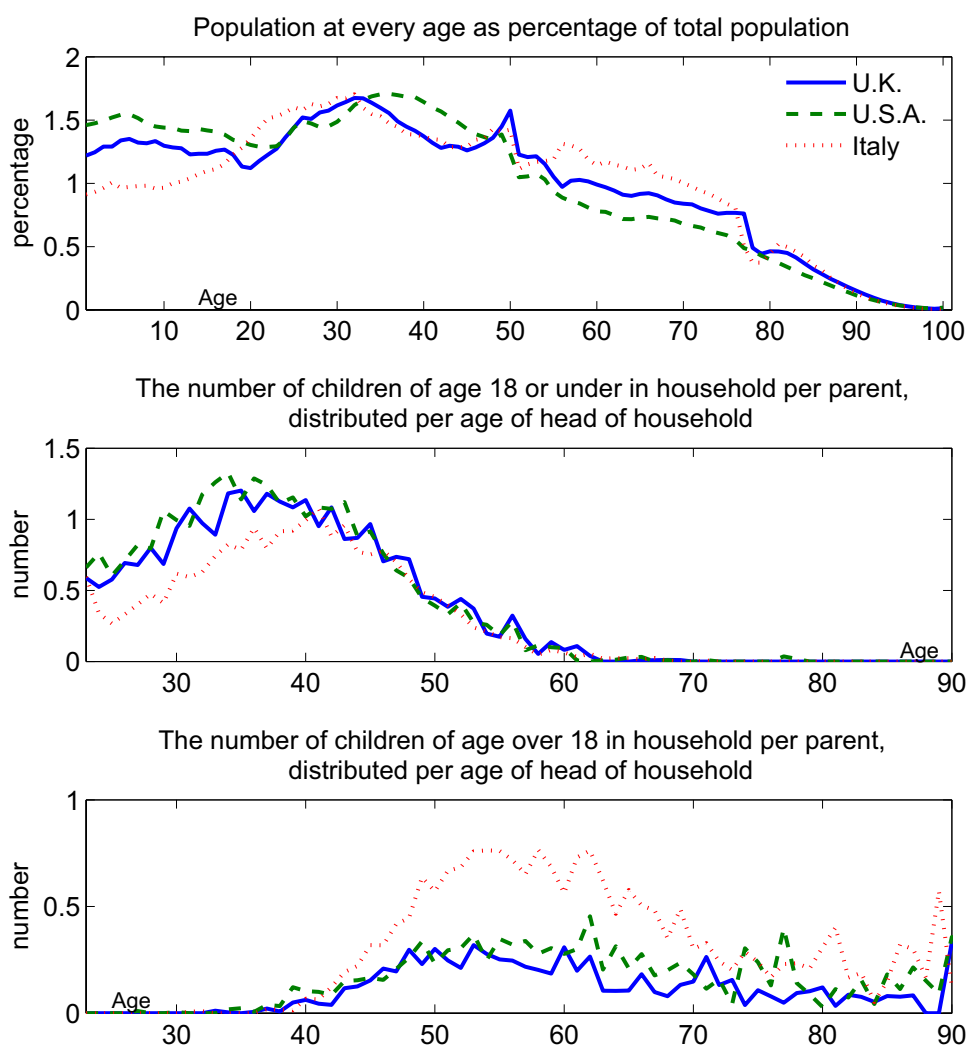


Figure 1: Distribution by Age of the Total Population (Panel 1) and Composition of Households by Age of Head of Household (Panels 2 and 3)

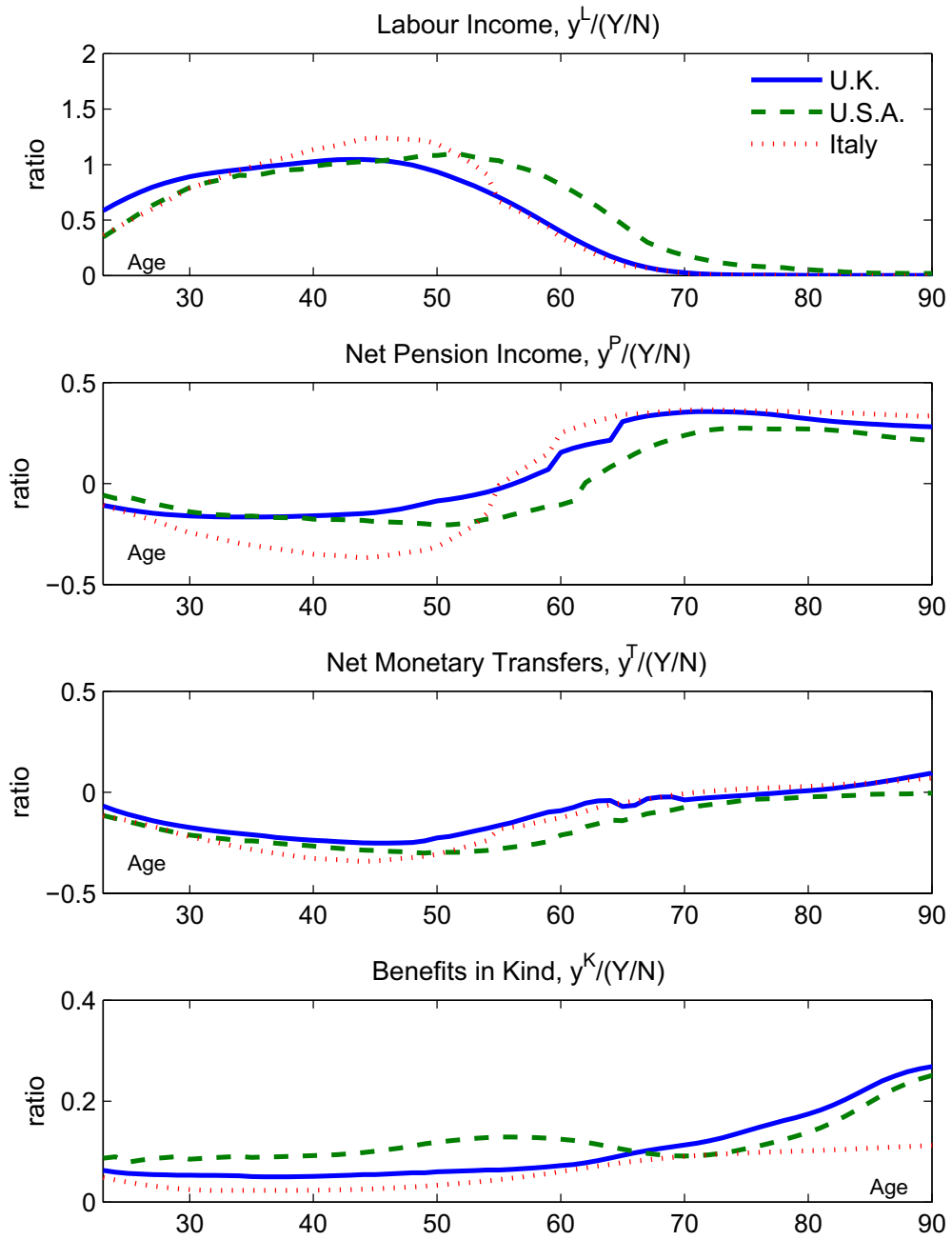


Figure 2: The average value of the four components of non-capital income by cohort age expressed as ratio of per capita national income.

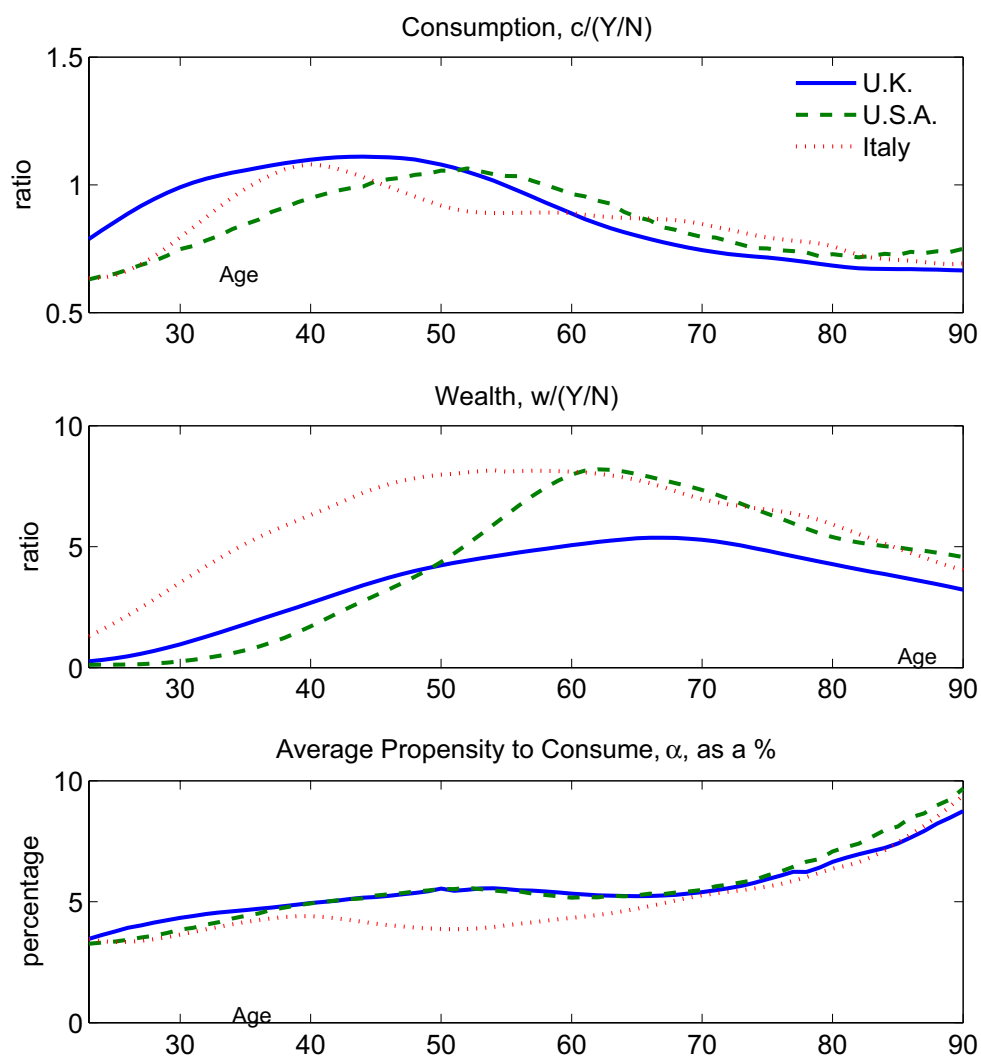


Figure 3: The average consumption (Panel 1), wealth holdings (Panel 2) and Propensity to Consume (Panel 3) by cohort age. The data in the first two panels is expressed as ratio of per capita national income.

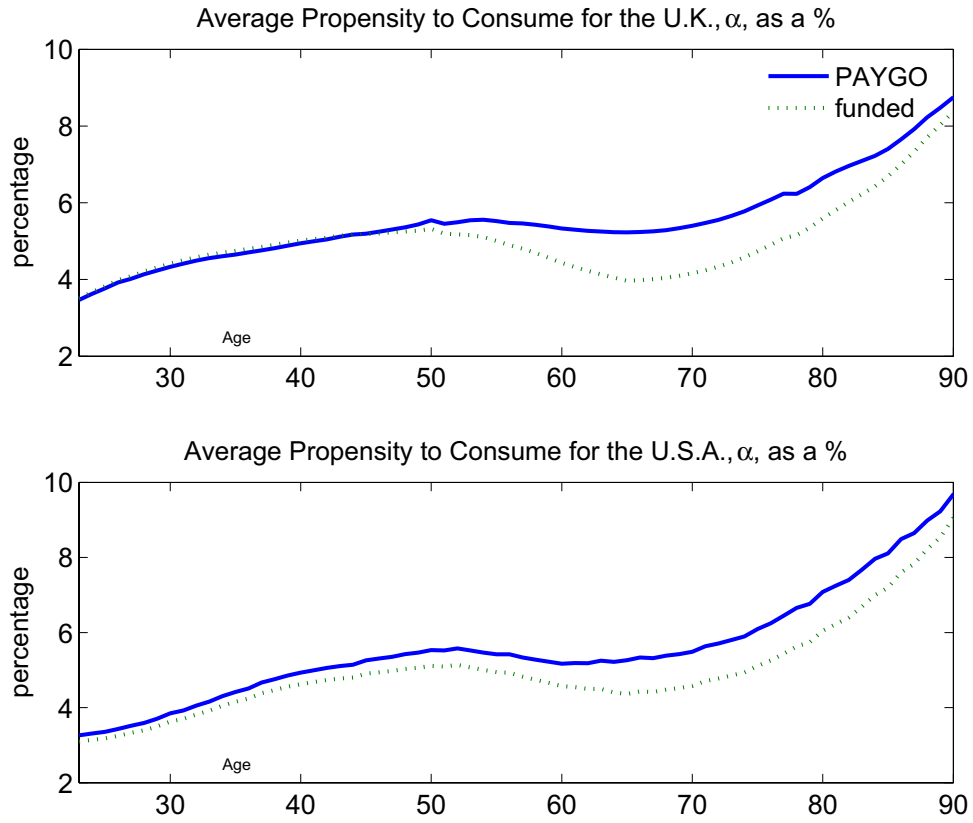


Figure 4: Comparison of the estimates of the Average Propensity to Consume (APC) by cohort age for both the UK and US under different accounting assumptions. The first approach treats all private pensions contributions as a tax, and all pension receipts as a transfer (i.e. similar to the accounting treatment of state PAYGO schemes); the second treats all private pension contributions as savings (i.e. similar to the accounting treatment of fully funded private DC pension scheme).

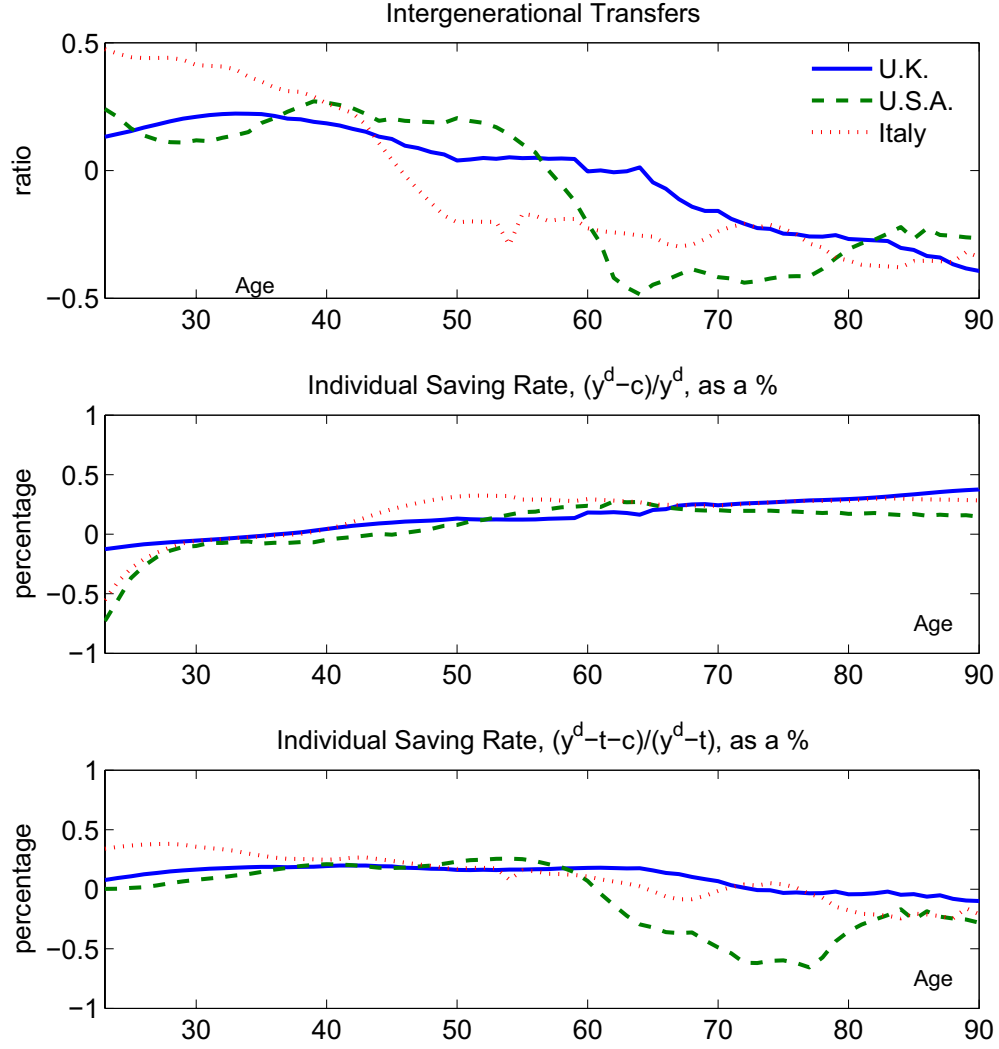


Figure 5: Average net private inter-generational transfers (Panel 1), average saving rates not including private inter-generational transfers as income (Panel 2) and average saving rates including inter-generational transfers as income (Panel 3) by cohort age. The data in the first panel is expressed as a ratio of average per capita income. Note: disposable income is $y_a^d = y_a^{NC} + rw_a$ is defined in Section 5.1.

References

- Attanasio, O. (1998). A Cohort Analysis of Saving Behavior by U.S. Households. *Journal of Human Resources* 33, 575–609.
- Attanasio, O. (1999). Consumption. In J. Taylor and M. Woodford (Eds.), *Handbook of Macroeconomics*. Amsterdam: Elsevier Science B.V.
- Attanasio, O. and J. Banks (1998). Recent Trends in Household Savings, A Tale of Two Countries. *Economic Policy* 13, 547 – 583.
- Banks, J., R. Blundell, and I. Preston (1994). Life-cycle expenditure allocations and the consumption costs of children. *European Economic Review* 38, 1391–1410.
- Blanchard, O. (1985). Debts, deficits and finite horizons. *Journal of Political Economy* 93, 1045–76.
- Börsch-Supan, A. (Ed.) (2003). *Life-Cycle Savings and Public Policy: A Cross-National Study in Six Countries*. Academic Press.
- Bosworth, B., G. Burtless, and J. Sabelhaus (1991). The Decline in Saving: Evidence from Household Surveys. *Brookings Papers on Economic Activity* 0, 183–241.
- Browning, M. and A. Lusardi (1996). Household saving: macro theories and micro facts. *Journal of Economic Literature* 34, 1797–1855.
- Bureau of Economic Analysis (1999). National Income and Product Accounts. U.S. Department of Commerce, Release month: December.
- Caballero, R. J. (1991). Earnings Uncertainty and Aggregate Wealth Accumulation. *American Economic Review* 81(4), 859–71.
- Cardarelli, R. and N. Sartor (2000). Generational Accounting for Italy. In *Fiscal Sustainability*. Bank of Italy.
- Cardarelli, R., J. Sefton, and L. Kotlikoff (2000). Generational Accounting in the UK. *The Economic Journal* 110, 547–574.
- Das, M. and B. Donkers (1999). How Certain Are Dutch Households about Future Income? An Empirical Analysis. *Review of Income and Wealth* 45, 325–338.
- Deaton, A. (1992). *Understanding consumption*. Oxford University Press, Clarendon Press.
- Deaton, A. and C. Paxton (2000). Growth and saving among individuals and households. *Review of Economics and Statistics* 82, 212–225.
- Farmer, R. E. A. (1990). RINCE Preferences. *The Quarterly Journal of Economics* 105, 43–60.
- Federal Reserve Board (2000). Flow of Funds. Release date: March 10.

- Gale, W. and J. Scholz (1994). Intergenerational Transfers and the Accumulation of Wealth. *Journal of Economic Perspectives* 8, 145–160.
- Gokhale, J., L. J. Kotlikoff, and J. Sabelhaus (1996). Understanding the Postwar Decline in U. S. Saving: A Cohort Analysis. *Brookings Papers on Economic Activity* 0, 315–90.
- Guiso, L. and T. Jappelli (1991). Intergenerational Transfers and Capital Market Imperfections: Evidence from a Cross Section of Italian Households. *European Economic Review* 35, 103–20.
- Guiso, L. and T. Jappelli (1998). Private Transfers, Borrowing Constraints and the Timing of Homeownership. *Centre for Economic Policy Research Discussion Paper* 2050, 44.
- Guiso, L., T. Jappelli, and L. Pistaferri (2002). An Empirical Analysis of Earnings and Employment Risk. *Journal of Business and Economic Statistics* 20, 241–253.
- Guiso, L., T. Jappelli, and D. Terlizzese (1992a). Earnings Uncertainty and Precautionary Saving. *Journal of Monetary Economics* 30(2), 307–37.
- Guiso, L., T. Jappelli, and D. Terlizzese (1992b). Saving and Capital Market Imperfections: The Italian Experience. *Scandinavian Journal of Economics* 94, 197–213.
- Holmans, A. (1994). House prices, land prices, the housing market and house purchase debt in the UK and other countries. *Economic Modelling* 11, 157–200.
- ISTAT (2000). Conti Nazionali.
- Jappelli, T. (2001). Introduction to International Comparisons of household savings behaviour: A study of life-cycle savings in seven countries. *Research in Economics* 55, 1–15.
- Jappelli, T. and M. Pagano (1989). Consumption and Capital Market Imperfections: An International Comparison. *American Economic Review* 79, 1088–1105.
- Jappelli, T. and M. Pagano (1994). Personal Saving in Italy. In J. Poterba (Ed.), *International comparisons of household saving*, National Bureau of Economic Research Project Report. University of Chicago Press.
- Jappelli, T. and M. Pagano (1999). Determinants of saving: lessons from Italy. In C. Reinhart (Ed.), *Accounting for Saving: Financial Liberalization, Capital Flows and Growth in Latin America and Europe*. Washington: Inter-American Development Bank.
- Jappelli, T. and L. Pistaferri (2000). The Dynamics of Household Wealth Accumulation in Italy. *Fiscal Studies* 21, 269–95.
- Kaplan, G. A., E. R. Pamuk, J. W. Lynch, R. D. Cohen, , and J. L. Balfour (1996). Inequality in Income and Mortality in the United States: Analysis of Mortality and Potential Pathways. *British Medical Journal* 312, 999–1003.
- Kapteyn, A. and C. Panis (2003). The Size and Composition of Wealth Holdings in the United States, Italy, and the Netherlands. RAND Working Paper 03-05.

- Kirsanova, T. and J. Sefton (2006). A Comparison of National Saving Rates in the UK, US and Italy. Working Paper. Available at SSRN: <http://ssrn.com/abstract=947104>.
- Office for National Statistics (2000). United Kingdom National Accounts: The Blue Book.
- Poterba, J. (1994). *International comparisons of household saving*. National Bureau of Economic Research Research Report. University of Chicago Press.
- Slesnick, D. (1992). Aggregate Consumption and Saving in the Postwar United States. *Review of Economics and Statistics* 74, 585–597.
- Wolff, E. N. (1999). Wealth Accumulation by Age Cohort in the U.S., 1962-1992: The Role of Savings, Capital Gains and Intergenerational Transfers. *Geneva Papers on Risk and Insurance: Issues and Practice* 24, 27–49.